Citation:

Brenna JT, Varamini B, Jensen RG, Diersen-Schade DA, Boettcher JA, Arterburn LM. Docosahexaenoic and arachidonic acid concentrations in human breast milk worldwide. *Am J of Clin Nutr.* 2007; 85 (6): 1,457–1,464.

PubMed ID: 17556680

Study Design:

Meta-analysis.

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To establish the distributions of docosahexaenoic (DHA) and arachidonic acid (AA) concentration in mature breastmilk from mothers worldwide consuming free-living or control diets.

Inclusion Criteria:

The studies were split into two groups, the primary group that included studies that used modern capillary GC to measure blood lipids and the secondary group that consisted of older studies that used older methodology, packed GC columns, to measure blood lipids.

Primary (Reference) Group

- Articles in the peer-reviewed literature that reported DHA and AA concentrations in breast milk from mothers of term infants in good health who consumed free-living or control diets during the intervention studies
- Analysis of DHA and AA using modern capillary gas chromatography (GC)
- Selection criteria related to the completeness of reporting and sampling.

Complete analysis was done only for Primary Group.

Secondary Group

Studies excluded from the primary group.

Exclusion Criteria:

Studies excluded from Primary Group, including:

- Special diets or consumed LCPUFA supplements

- Pooled and banked samples
- Only one mother
- Pre-term infants
- Reported concentrations by lipid class only
- Packed GC columns.

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Description of Study Protocol:

Recruitment

PubMed searches were performed using the keywords "breastmilk" and "docosahexaenoic" periodically over several years, most recently in November 2006.

Design

Meta-analysis.

Statistical Analysis

- Summary statistics of DHA and AA concentrations (percent of total fatty acids) were provided from the primary group of articles and the secondary group
- Means and SDs were calculated from primary and reference (inclusion criteria) and secondary (exclusion criteria) groups for comparison
- Distribution analysis of values was used for the primary group
- Correlation between mean concentration of AA vs. DHA in breastmilk.

Data Collection Summary:

Dependent Variables

- DHA concentration in breast milk
- AA concentration in breast milk.

Independent Variables

Free-living or control diets: Mothers must have consumed their normal diets without any kind of manipulation such as marine-oil supplementation.

Description of Actual Data Sample:

- *Initial N:* 106 studies
- *Attrition (final N):* 65 studies; 2,474 women (after exclusion)
- *Age:* Infant age range was zero to 18 months
- *Other relevant demographics:* The two- to six-month post-partum data were used when values from multiple points post-partum were available
- *Anthropometrics:* The infant ages varies from zero to 18 months
- *Location:* International studies.

Summary of Results:

Key Findings

- In the primary group, the DHA and AA concentrations in the breast milk were 0.32%±0.22% (range 0.06% to 1.4%) and 0.47%±0.13% (range 0.24% to 1.0%), respectively, indicating that the DHA concentration in breast milk is lower than and more variable than that of AA
- The highest DHA concentrations were primarily in coastal populations and were associated with marine food consumption
- The correlation between DHA and AA was significant, but low (R=0.25; P=0.02) in the primary group, indicating that the mean ratio of DHA to AA in regional breast milk varies widely
- In the primary group, the CV for DHA was 0.22 over 0.32 (69%), while AA was 0.13 over 0.47 (28%).

Other Findings

- In the secondary analysis group, DHA and AA concentrations were greater than the primary (reference) group; 0.40%±0.41% and 0.56%±0.26%, respectively
- The mean value for AA deviated by 0.09% from the primary group, whereas the mean value for DHA deviates by 0.08% (wt:wt).

Author Conclusion:

This comprehensive analysis of breast-milk DHA and AA indicates a broad range of these nutrients worldwide and serves as guide for infant feeding. The correlation between DHA and AA was surprisingly low, which reflects a high degree of variability in the ratio of DHA to AA in individual breast milk samples.

Reviewer Comments:

Most of the studies included in the analysis were from developed countries and therefore should be used as a guide for only those population. Studies varied largely in sample sizes and infant ages. The highly variability in the ratio of DHA to AA probably due to the diet and other factors were discussed by the authors.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions		
1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes

4.	Will the information, if true, require a change in practice?	Yes

Validity Questions		
1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes